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भारतीय मानक

अल्प दाब द्रवणीय गैसों के लिए 5 लिटर से अधिक जल क्षमता वाले वेल्डित अल्प कार्बन इस्पात के सिलिंडर — उपयोग किए गए एल पी जी सिलिंडरों के पुनर्नवीयन और निरीक्षण की रीति संहिता

Indian Standard

WELDED LOW CARBON STEEL CYLINDERS EXCEEDING 5 LITRE WATER CAPACITY FOR LOW PRESSURE LIQUEFIABLE GASES — CODE OF PRACTICE FOR INSPECTION AND RECONDITIONING OF USED LPG CYLINDERS

UDC 621-642·02-404 : 662·767-620·11

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1991

Price Group 3

Gas Cylinders Sectional Committee, HMD 16

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Gas Cylinders Sectional Committee had been approved by the Heavy Mechanical Engineering Division Council.

This code of practice covers examination, re-conditioning and the creteria for declaring an used LPG cylinder unserviceable.

Manufacture, possession and use of any gas, when contained in cylinders of more than 500 ml water capacity in a compressed or liquefied state, are regulated under the Gas Cylinder Rules, 1981, of the Government of India. This code of practice has been prepared in consultation and agreement with the statutory authorities under those rules.

This code has been formulated based on the practice followed in the country for the re-conditioning of LPG cylinders. For the convenience, it is divided into following two sections:

Section 1 Inspection

Section 2 Detailed examination and reconditioning

For the purpose of deciding whether a particular requirement of this code is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this code.

The relevant SI units and the corresponding conversion factors are given below for guidance.

Pressure 1 Pa (Pascal) = 1 N/m^2
1 kgf/mm^2 = 9·806 65 MPa

AMENDMENT NO. 2 JULY 2010
TO
IS 13258 : 1991 WELDED LOW CARBON STEEL CYLINDERS EXCEEDING 5 LITRE WATER CAPACITY FOR LOW PRESSURE LIQUEFIABLE GAS — CODE OF PRACTICE FOR INSPECTION AND RECONDITIONING OF USED LPG CYLINDERS

(*Page* 3, *clause* **10.5.1.1**) — Substitute the following for the existing:

‘**10.5.1.1** Cylinder wall thickness so achieved shall not be less than the minimum calculated wall thickness as per IS 3196 (Part 1).’

(ME 16)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 1 NOVEMBER 2009
TO
IS 13258 : 1991 WELDED LOW CARBON STEEL CYLINDERS EXCEEDING 5 LITRE WATER CAPACITY FOR LOW PRESSURE LIQUEFIABLE GASES — CODE OF PRACTICE FOR INSPECTION AND RECONDITIONING OF USED LPG CYLINDERS

(*Page* 1, *clause* **2**) — Insert the following at the appropriate places:

IS 4683 : 1968	Chilled iron shot and grit for use in foundries
IS 6586 : 1989	Metal spraying for protection of iron and steel — Recommended practice (*first revision*)

(*Page* 4, *clause* **16.1**, *third line*) — Substitute '12 kgf/cm^2' *for* '980 kPa (10 kgf/cm^2)'.

(*Page* 5, *clause* **18.2**, *first para*) — Substitute the following for the existing:

'The outside surface shall be grit blasted with minimum SA 2.5 grade of blast (*see* IS 4683) and shall have the following protective coatings:'

[*Page* 5, *clause* **18.2**(a)] — Substitute the following for the existing:

'a) Spraying zinc as per IS 6586 to give a coating of minimum thickness of 37 microns unless otherwise agreed between the purchaser and the manufacturer.'

(ME 16)

Reprography Unit, BIS, New Delhi, India

Indian Standard

WELDED LOW CARBON STEEL CYLINDERS EXCEEDING 5 LITRE WATER CAPACITY FOR LOW PRESSURE LIQUEFIABLE GASES — CODE OF PRACTICE FOR INSPECTION AND RECONDITIONING OF USED LPG CYLINDERS

1 SCOPE

This code lays down the requirements for the inspection, materials, procedure, testing and marking for reconditioning of used LPG cylinders of capacity exceeding 5 litres and up to and including 250 litres.

2 REFERENCES

The Indian Standards listed below are necessary adjuncts to this standard:

IS No.	*Title*
5 : 1978	Colours for ready mixed paints and enamels (*third revision*)
2932 : 1974	Enamel, synthetic, exterior (a) undercoating (b) finishing (*first revision*)
3196 (Part 1) : 1991	Welded low carbon steel cylinders exceeding 5 litre water capacity for low pressure liquefiable gases : Part 1 Cylinders for liquefied petroleum gases (LPG) — Specification (*fourth revision*)
3196 (Part 3) : 1991	Welded low carbon steel cylinders exceeding 5 litre water capacity for low pressure liquefiable gases : Part 3 Methods of test
7241 : 1981	Glossary of terms used in gas cylinder technology (*first revision*)
8867 : 1978	Saturated vapour pressure and test pressure for low pressure liquefiable gases contained in gas cylinders

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 7241 : 1981 shall apply. In addition the following definitions shall also apply.

3.2 Bulge

Swelling of the cylinder wall.

3.3 Burn

Isolated heat-affected sections of the cylinder wall caused by electric arc or high temperature flame impingement (for example, oxy-acetylene flame).

3.4 Cut (Gouge)

A sharp impression where the metal has been removed or redistributed.

3.5 Dent

A blunt depression where the surface material has not been penetrated.

3.6 Dig

A sharp depression where the surface material has been penetrated.

3.7 Fire

Damage to the cylinder as a result of fire.

3.8 Gas Leakage

Gas escaping through the cylinder.

3.9 General Corrosion

Corrosion more extensive than pit or line corrosion.

3.10 Line Corrosion

Corrosion in a line, often at a junction with an attachment (for example, footring) not greater than 6 mm wide at the surface.

3.11 Pit

Local corrosion not in excess of 6 mm diameter and occurring not more frequently than one in any 500 mm^2 of the surface.

SECTION 1 INSPECTION

4 INSPECTION EQUIPMENT AND METHOD OF MEASUREMENT

Exterior corrosion, denting, bulging, gouges or digs are normally measured by simple direct measurement with scales or depth gauges. The defect can also be measured using a rigid straight edge of sufficient length placed over the defect and a scale is used to measure the distance from the bottom of the straight edge to the bottom of the defect. Suitable depth gauges may also be used for measuring the depth of small cuts or pits. It is important when measuring such defects to use a scale which spans the entire affected area. When measuring cuts, the upset metal should be removed or compensated for so that only actual depth of metal removed from the cylinder wall is measured.

5 EXTERNAL EXAMINATION

5.1 General

Cylinders shall be examined externally for rust, scale, damage and other physical defects. Protective paint, plating or other coatings and foreign matter shall be removed where necessary from the external surface of the cylinder so that the surface can be properly examined. In determining the condition of the cylinder the examiner shall take into consideration its length of service and the minimum wall thickness required by the specification to which the cylinder was made.

The limits shown in 6 shall be used in assessing defects and the conditions which necessitate declaring the cylinders unserviceable.

6 MEASUREMENT OF DEFECT AND CRITERIA FOR DECLARING A CYLINDER UNSERVICEABLE

6.1 Bulge

Cylinders shall be declared unserviceable when a variation of one percent or more exists in the measured circumferences or in prepheral distances measured from the valve pad to the centre seam (or equivalent fixed point) according to **6.1.1**.

6.1.1 *Measurement of Bulges*

Bulges in cylinders shall be measured by any of the following ways :

a) Bulges on the cylinder side wall can be measured by comparing a series of circumferential measurements.

b) Bulges in the head and in some cases on the side wall can be measured by comparing a series of measurements or the peripheral distance between the valve pad and the centre seam (if any) or an equivalent fixed location on the cylinder sidewall.

c) Variations from normal cylinder contour can be measured directly by either measuring the height of bulge with a scale or comparing templates of bulged areas with similar areas not bulged.

6.2 Burn

Cylinders having burns shall be declared unserviceable.

6.3 Dent

Cylinders shall be declared unserviceable when the depth of a dent is greater than one-tenth of the mean diameter of the dent or the mean diameter or the dent is greater than one-quarter of the diameter of the cylinder. Dent on a weld shall not be permitted, but flattening (wear) of weld shall not be treated as a dent on the weld. Dent adjacent to the flattened weld shall be treated as a dent on the weld.

6.4 Dig

Cylinders shall be declared unserviceable when a dig on a cylinder body is 75 mm or more in length and the depth of the dig is more than 4 mm.

6.5 Cut

Cylinders shall be declared unserviceable when a cut on a cylinder body is 75 mm or more in length. In other cases the cylinder shall be taken for further examination in accordance with Section 2.

6.6 Pit

Cylinders having pit shall be taken for examination in accordance with Section 2. However it will be left to the discretion of the inspecting officer to decide whether the cylinder is unserviceable or requires further examination.

6.7 Line Corrosion

Cylinders having line corrosion shall be taken for examination in accordance with Section 2. However, it will be left to the discretion of the inspecting officer to decide whether the cylinder is unserviceable or requires further examination.

6.8 General Corrosion

Cylinders having general corrosion shall be taken for examination in accordance with Section 2. However, it will be left to the discretion of the inspecting officer to decide whether the cylinder is unserviceable or requires further examination.

6.9 Gas Leak

When a leak is suspected, the cylinder shall be pressurized and submerged in a water-bath or soapy water shall be applied to the area of the suspected leak. Areas around the base shall be particularly checked. Cylinders leaking at a weld shall be submitted for repairs. If satisfactory repairs cannot be done, cylinders shall be declared unserviceable. Cylinders leaking in any other part of the body shall be declared unserviceable.

6.10 Fire

6.10.1 Cylinders shall be reheat-treated, hydrostatically tested and finished before being returned to service where :

a) paint is burned of,

b) bulging not exceeding the limit given in **6.1** has occurred, and

c) no other sign of excessive heat damage is evident.

6.10.2 Cylinders shall be declared unserviceable where :

a) warping or distortion has resulted.

b) bulging exceeding the limit given in **6.1** has occurred, or

c) other signs of excessive heat damage are evident.

SECTION 2 DETAILED EXAMINATION AND RECONDITIONING

7 MATERIAL

The material used for manufacturing the replacements of detachables like shroud, valve protection ring and footring shall be as specified in IS 3196 (Part 1) : 1991. The tube used for making valve protection ring shall conform to the owner's requirement as detailed in their drawing.

8 REPLACEMENT DETACHABLES

8.1 The design of all detachables shall meet the requirements laid down in IS 3196 (Part 1) : 1991 for individual parts respectively.

8.1.1 The design shall also conform to the owner's requirement as detailed in their drawing.

9 DEGASSING OF CYLINDERS

9.1 Valves of cylinders taken for processing shall be removed by employing a proper fixture and a suitable wrench using a close fitting hexagonal adopter. It shall be ensured that only depressurised cylinders are taken for the removal of the valve.

9.2 Cylinder shall be degassed by suitable method and each cylinder shall be checked with explosive meter to ensure complete degassing. The degassing station and procedures shall have the approval of the statutory authority.

10 DETAILED EXAMINATION

10.1 Cylinders received for reconditioning shall be examined in accordance with Section 1.

10.2 External Cleaning

Each cylinder shall be cleaned externally by wire brushing, water jet abrassive cleaning, approved chemical cleaning or any other suitable method.

10.3 Internal Cleaning

Each cylinder shall be internally cleaned by any of the following methods.

10.3.1 Where the interior of the cylinder is contaminated by oil or other similar fluid it shall be cleaned by one of the following methods:

a) Steam cleaning, and

b) Washing out with an approved solvent.

10.3.2 Where the interior of a cylinder is affected by rust or other foreign matter it shall be cleaned by one of the following methods:

a) Approved blasting, rotary wire brushing or rumbling procedure; or

b) Burn out treatment in a furnace at 300°C for a period not exceeding one hour after which all free rust and scale shall be removed by methods given in **10.3.1**.

10.4 Tare Weight Verification

After degassing and through cleaning (internally and externally), cylinders shall be checked for correct determination of the tare weight (weight of the empty cylinder with valve and its safety cap, footring and V.P. ring). Any cylinder having lost its tare weight by over 5 percent of its original tare weight shall be declared unserviceable.

10.5 External Inspection

10.5.1 Affected portions of the body of the cylinders segregated during inspection under Section 1 shall be ground to achieve a defect free surface.

10.5.1.1 Cylinder wall thickness so achieved shall not be less than 90 percent of the designed wall thickness.

10.6 Internal Inspection

The entire internal surface of the cylinder shall be examined by means of an extra low voltage inspection lamp and the cylinder shall be declared unserviceable if the bottom of an internal defect cannot be seen and its extent cannot be measured.

11 SEGREGATION OF CYLINDERS

Cylinders on the basis of inspection shall be segregated in accordance with **11.1** and **11.2**.

11.1 Unserviceable

Cylinders with any one or more of the following conditions shall be declared unserviceable:

a) Cylinders declared unserviceable when inspected according to Section 1;

b) Cylinders having lost their identity (Manufacturer's name, serial number of the cylinder, test date and original tare weight);

c) Cylinders coming for repairs for the second time; and

d) The cylinders having wall thickness less than the minimum thickness as permitted in **10.5.1.1**.

Cause(s) of rejection of all the unserviceable cylinders shall be recorded in the proforma as shown in Annex A and cause may be coded in the following manner:

Bulge — E — 1
Burn — E — 2
Dent — E — 3
Dig — E — 4
Cut — E — 5
Pit — E — 6
Line corrosion — E — 7
General corrosion — E — 8
Bung thread damage — E — 9
Loss in tare weight — E — 10
Identity lost — E — 11
Cylinder identified as once repaired — E — 12
The bottom of internal defect cannot be seen and it's extent cannot be measured — I — 1
The wall thickness has been reduced by more than the specified value — I — 2

11.2 Repairable

Cylinders which are found serviceable according to **10.1** and **11.1** shall be considered repairable. These cylinders shall be taken for further processing and reconditioning. Cylinders with following types of defects shall be permitted for repairs:

a) Damaged footrings can be replaced with new ones. No partial replacement of the footring shall be permitted.

b) Damaged valve protecting ring/shroud may be replaced or repaired.

NOTE — The need for replacement of footring and valve protecting ring shall be decided by the Inspecting Authority.

12 RECONDITIONING

12.1 Removal of Footring and Valve Protecting Ring

12.1.1 Damaged/Defective foot ring and valve protecting ring shall be removed without damaging the body of the cylinder. The welded spots shall be ground and cleaned thoroughly for checking the surface for line corrosion, pits, etc, and wall thickness before fitting new footring and valve protecting ring.

12.2 Dedenting

Dedenting of cylinders if required shall be done by a process approved by statutory authority.

12.3 Fixing New Footring and Valve Protecting Ring/Shroud

New footring and valve protecting ring/shroud shall be welded in accordance with IS 3196 (Part 1) : 1991 and all welds shall be inspected for weld defects.

13 STRESS RELIEVING

All the hot worked or cold worked cylinders shall be normalized or stress relieved suitably.

14 HYDROSTATIC TEST

14.1 Each heat treated cylinder shall be subjected to hydrostatic test. During the hydrostatic test, the pressure shall be increased gradually till the required test pressure is reached. After the test pressure is reached and the external surfaces of the cylinder are dried it shall be retained for a period of not less than 30 seconds. Any reduction in pressure noticed during this retention period or any leakage, or visible bulge of deformation shall be treated as a case of failure in the test and the cylinder shall be declared unserviceable.

14.1.1 The value of hydrostatic test pressure for LPG shall be taken as 25 kgf/cm^2 as specified in IS 8867 : 1978.

14.1.2 Hydrostatic Test shall be carried out according to **7** of IS 3196 (Part 3) : 1991.

15 FIXING OF VALVE

Prior to fixing of valves on to the cylinder, bung threads shall be cleaned using appropriate tap and checked for any imperfections, distortion etc. Valves shall be fitted using a suitable torque of 200 ± 20 Nm. A suitable jointing material should be used between the valve and bung to arrest leakage of LPG through this joint.

16 PNEUMATIC TEST

16.1 Each cylinder after it has been dried and fitted with valve shall be tested for leakage by subjecting to air pressure of not less than 980 kPa (10 kgf/cm^2) for a period of one minute while immersed in water and shall show no leakage from the body of the cylinder and the joint between valve and bung. This test shall be carried out after fixing the safety cap on the valve.

16.2 Pneumatic Leakage Test shall be carried out according to **8** of IS 3196 (Part 3) : 1991.

17 DESHAPING

Cylinders declared unserviceable during inspection/tests shall be returned to the owner for proper deshaping or shall be deshaped under the supervision of inspecting authority as per owner's option.

18 PREPARATION FOR DESPATCH

18.1 Before being fitted with valves, all cylinders shall be thoroughly cleaned, dried internally.

18.2 The outside surface of the cylinders shall be shot blasted and given following protective coatings:

a) Spraying Zinc or Aluminium to give a coating of minimum thickness of 37 microns unless otherwise agreed between the purchaser and repairer.

b) One coat of "Zinc Chromate Primer" as agreed between the purchaser and repairer.

c) One coat of super synthetic enamel paint conforming to IS 2932 : 1974 of signal red colour (Shade No. 537 of IS 5 : 1961).

Both the layers of the primer and paint shall have a total thickness of minimum 30 microns.

19 RECORDS

A record shall be maintained for all tests, reconditioning and inspections at the cylinder repairer's works and copies shall be made available to the inspecting authority and owner of the cylinder, if desired. A test certificate duly approved and signed by the inspecting authority shall be forwarded to the statutory authority and the owner (*see* Annex B).

20 MARKINGS

The cylinders fitted with new footring and V.P. ring shall be immediately marked with the following original markings on the footring and vertical stays of V.P. ring as applicable:

a) Serial number of the cylinder.

b) Original manufacturer's name and repairer's identification.

c) New tare weight and gross weight of cylinder in kg.

d) Month and year of manufacture, retest and reconditioning.

e) The maximum working pressure, and test pressure in kgf/cm^2.

f) Water capacity in litres.

g) Loss in tare weight, if observed under **10.4** shall be punched at the footring (Example — If the loss in tare weight is 200 g, it shall be punched as LTW 200.)

The letter 'R' shall be conspicuously stamped on the vertical stay of the valve protecting ring as close to certification mark as practicable for identification that the cylinder is reconditioned. The letter 'R' shall be stamped on the footring also.

ANNEX A

(*Clause* 11.1)

LIST OF CYLINDERS UNSERVICEABLE

Repairer's Name :
Order No. :
Batch No. :
Certificate No. :
Date :

Cylinder Sl No.	*Original Manufacturer's Name*	*Date of Manufacture*	*Date of Rejection*	*Cause of Rejection*

Repairing Company's Representative

Inspecting Officer

ANNEX B

(*Clause* 19)

LIST OF CYLINDERS ACCEPTED

Repairer's Name :
Order No. :
Batch No. :
Certificate No. :
Date :

Cylinder Sl No.	*Original Manufacturer's Name*	*Date of Manufacture*	*Date of Repair/ Test*	*Details of Repairs Carried Out*

Repairing Company's Representative

Inspecting Officer

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